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(12) **Patent:**

(54) PORTABLE PNEUMATIC SAW

(54) SCIE PORTATIVE PNEUMATIQUE

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ABSTRACT:

CLAIMS: Show all claims

*** Note: Data on abstracts and claims is shown in the official language in which it was submitted.

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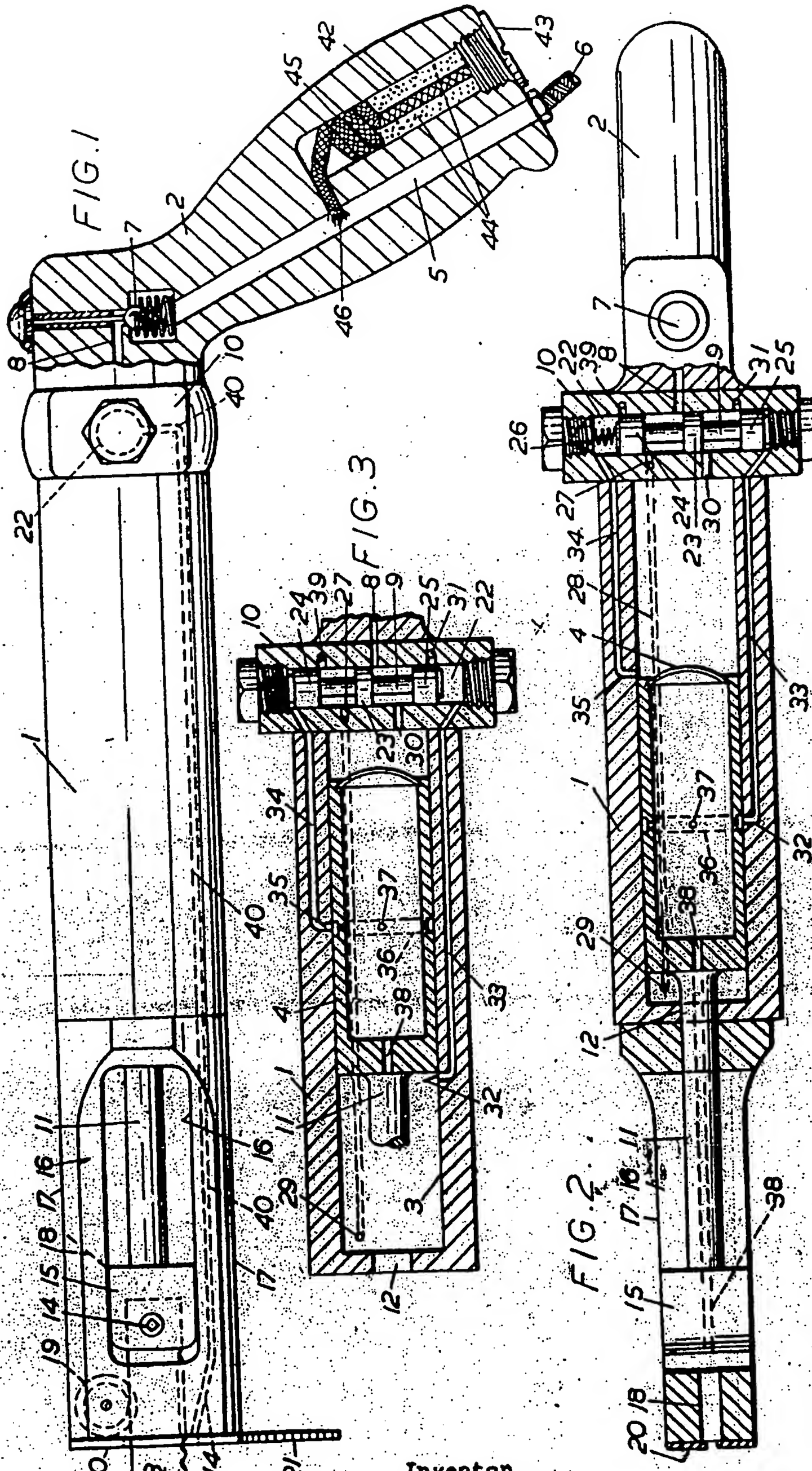

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This invention relates to a portable pneumatic tool of the type in which a reciprocating piston operates in a cylinder to which compressed air is admitt d alternately to each end of the cylinder, the piston driving a saw blade or like implement in reciprocating movement.

According to the invention compressed air is admitted alternately to both ends of the piston cylinder through ports controlled by a slide valve, the valve itself being located at one end of the cylinder and transverse thereto and being operated directly by compressed air supplied alternately to both its ends. The compressed air will be supplied to the ends of the valve through ports controlled by the piston, these ports being in the cylinder wall and communicating with longitudinal passages in the body and uncoverable by the piston at an appropriate point during each stroke of the piston to supply pressure air to the ends of the valve from the piston cylinder.

The slide valve will connect either end of the piston cylinder to a port leading to atmosphere at the same time as it connects pressure air to the other end of the cylinder, and the valve itself will have either end connected to atmosphere through ports in the cylinder wall and an external annular groove in the piston and a longitudinal passage in the body of the piston at the same time as the piston connects pressure air to the other end of the valve.

In order that the invention may be clearly understood and readily carried into effect, the same will now be more fully described with reference to and by the aid of the accompanying drawings, in which:

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Figure 1 is a side elevation (partly in section) of a portable saw constructed according to the invention.

Figure 2 is a diagrammatic sectional plan view of Figure 1.

Figure 3 is a fragmentary view, similar to Figure 2, showing the valve mechanism and piston in a different position.

Referring to the drawings generally, the portable pneumatic saw comprises a cylindrical body 1 with a pistol type hand-grip 2 at one end, the interior of the body 1 being formed as a cylinder 3, co-axial with the body 1, which contains a piston 4 of hollow construction for the sake of lightness.

Compressed air is supplied to the passage 5 in the pistol grip 2 by the flexible supply pipe 6, and then by way of the control valve 7 of well-known type, the air supply can be admitted at the will of the operator to a further passage 8 leading to a slide valve 9 located in a transverse housing 10 located at this end of the body 1, the function of the slide valve being primarily to supply the compressed air alternately to the ends of the piston cylinder 3, as will be described later.

At the other end of the body 1 a piston rod 11 protrudes through a hole 12 in the end wall of the cylinder 3 as a sliding fit, and to this piston rod is secured a saw blade 13, which is driven in reciprocation as the piston is reciprocated by the compressed air.

The screw 14 which secures the saw blade 13 to the piston rod also secures a metal block 15 to the end of the rod 11, and this block 15 is a good sliding fit between upper and lower bearing surfaces 16 provided by a yoke 17 formed as an extension of the body 1, the purpose of this arrangement being to absorb any twisting effect on the blade when circular or irregularly shaped cuts are being made. The upper outer end of the yoke 17 is slotted at 18 and the slot houses a grooved disc 19 so placed as to take the upward thrust of the blade 13 when sawing, and a slotted plate 20 the bottom of which extends below the lower edge of the yoke 17 as an index pointer 21, is also secured to the end of the yoke, the purpose being to give additional support against twisting of the blade 13 and to enable a marked line to be followed when sawing.

The slide valve 9 is of the cylindrical 'dumbell' type, slidable within a valve cylinder 22, and has a central land 23 and lands 24 and 25 at each end, whilst a very light spring 26 at one end of the valve ensures that it always comes to rest at one end of its stroke, as shown in Figure 2, although the spring can be placed at either end of the valve. Referring to Figure 2, when starting to operate the tool from rest, the valve 9 will be in the position shown due to the spring 26, and the piston 4 may be in any position although it is shown at the forward limit of its stroke. Air supply from the passage 8 is directed by the valve to the port 27, through the passage 28 in the cylinder body and from the port 29 into the forward end of the piston cylinder 3, wher it

commences to drive the piston 4 along the cylinder. Air from the rear end of the cylinder leaves it by the port 30 and is directed by the valve 9 to the exhaust port 31 whence it exhausts to atmosphere as described later.

The piston moves along the cylinder 3 until it reaches the position shown in Figure 3, when the piston uncovers a port 32 in the cylinder wall. This port communicates by a passage 33 to the end of the valve cylinder 22 against which the valve 9 is resting, and thus a blast of pressure air from the cylinder 3 along the passage 33 blows the valve from the position shown in Figure 2 to that shown in Figure 3, i.e. to the other end of its cylinder 22. Referring to Figure 3, the exhaust air from the 'spring' end of the valve passes down the passage 34 and through the port 35 in the piston cylinder wall. An annular groove 36 in the piston 4 is aligned with the port 35 at the same time as the port 32 is uncovered by the piston, so that exhaust air from the end of the valve cylinder passes into the annular groove 36, through radial holes 37 into the hollow interior of the piston body, and thence to atmosphere through a longitudinal passage 38 in the piston rod 11.

Referring to Figure 3, the movement of the valve has now connected the supply passage 8 to the port 30, the port 31 being covered by the end land 25, so that pressure air is now being delivered to the rear end of the piston cylinder 3, to bring the piston 4 to rest and then drive it in the opposite direction, whilst at the same time the

port 27 has been connected by the valve to an exhaust port 39 which has been uncovered by the end land 24.

The piston 4 travels back along the cylinder 3 until its rear end uncovers the port 35 in the cylinder wall, when a blast of pressure air through this port and along the passage 34 to the 'spring' end of the valve blows the valve back to the position shown in Figure 2. As the port 35 is uncovered by the piston, the annular groove 36 in the piston 4 is aligned with the port 32 in the cylinder wall, so exhaust air from the opposite end of the valve 9 escapes to atmosphere by the passage 30, annular groove 36 and holes 37 in the body of the piston, and the passage 38 in the piston rod 11. The cycle then re-commences, and continues so long as the air supply is maintained, thus reciprocating the piston 4 in its cylinder.

The exhaust ports 31 and 39 in the valve cylinder 22 will lead into a common passage 40 (see Figure 1) which passes longitudinally through the body 1 and yoke 17 to terminate in an outlet port 41 arranged at an angle to the saw blade 13 immediately adjacent the point at which sawing takes place, and thus the exhaust air is directed against the blade to cool it and also prevent particles of swarf entering the yoke 17, where it could cause excessive wear between the block 15 and the bearing surfaces 16. A cover or shield (not shown) may be provided for enclosing the yoke and preventing ingress of dirt.

An oil chamber 42 is situated in the pistol grip 2

alongside the air supply passage 5, the chamber being closed by a screw stopper 43 and containing a felt pad 44 and wick 45. A small portion 46 of the wick protrudes into the passage 5, and when the control valve 7 is opened to start the tool, the small quantity of oil contained in the portion of the wick 46 actually in the passage 5 is carried through by the ingoing air in atomised form to lubricate the working parts of the tool, the quantity of oil carried in each time the valve 7 is operated depending upon the size of the wick portion 46.

The piston 4 does not strike the ends of the cylinder 3 during operation of the tool, the air supply reversing and preventing it so doing, and the instantaneous reversal of the air supply together with the momentum of the piston results in a beneficial building up of pressure at the ends of the piston cylinder with improved performance of the tool. A portable saw constructed according to the invention is very powerful, cannot be 'stalled', is very economical in the consumption of compressed air, and the working parts have a very long life due to the simplicity of design and the absence of metal to metal mechanical operation of the slide valve. With suitable tools, the pneumatic tool will rapidly saw or file metal, wood, stone, marble and like materials, and with the aid of the index pointer a marked line on the material can be followed with great accuracy.

As regards the sawing of sheet metal, it is advantageous to secure a saw blade to the piston rod with the teeth pointing towards the tool body, the blade then tending to draw the flexible material towards the front of the yoke of the tool, which can then be used to keep the material steady.

Th embodiments of the invention in which an exclusive property or privilege is claimed, are as follows:

1. In a pneumatic tool comprising a body with an internal cylinder, the combination of a valve slideway in the body at one end of the cylinder and transverse thereto, an arrangement of ports and passages in the tool body connecting the valve slideway with the pressure air supply, the ends of the cylinder and atmosphere, a valve member slidable in said slideway and co-actable with said ports and passages to connect one end of the cylinder to pressure air supply and the other end to atmosphere when at one end of its slideway and reverse said connections when at the other end of its slideway, with an arrangement of ports and longitudinal passages in the tool body connecting each end of the valve slideway with the cylinder, a hollow piston slidable in said cylinder and an implement carrying rod upon said piston which protrudes through the end of the tool body, an external annular groove in said piston, associated ports and a passage longitudinally through the piston body and rod, the piston and its annular groove co-acting with said ports and passages in the tool body to connect one end of the valve slideway to pressure air in the piston cylinder and the other end of the slideway to atmosphere by the annular groove when the piston reaches one end of its travel in the cylinder and reverses said connections when it reaches the other end of its cylinder, thereby reversing the position of the valve each time it reaches the ends of its travel, and effecting reciprocation of itself in the cylinder.

2. In a pneumatic tool comprising a body with an int rnal cylinder, the combination of a valve slideway in the body at one end of the cylinder and transverse thereto, an arrangement of ports and passages in the tool body the connecting valve slideway with the pressure air supply, the ends of the cylinder and atmosphere, a valve member slidable in said slideway and co-actable with said ports and passages to connect one end of the cylinder to pressure air supply and the other end to atmosphere when at one end of its slideway and reverse said connections when at the other end of its slide-way, with an arrangement of ports and longitudinal passages in the tool body connecting each end of the slideway with the cylinder, a hollow piston slidable in said cylinder and an implement carrying rod upon said piston, a block securable at the outer end of said rod and a yoke upon the forward end of the body engaging said block as a bearing and support, an external annular groove in the piston, ports within the groove communicating with the interior of the piston and an associated longitudinal passage through the piston rod, the piston and its annular groove co-acting with the ports and passages in the tool body to connect one end of the valve slideway to pressure air in the piston cylinder and the other end of the slideway to atmosphere by the annular groove when the piston reaches one end of its travel in the cylinder, and reverse said connections when it reaches the other end of its cylinder, thereby reversing the position of the valve each time it reaches the end of its travel, and effecting reciprocation of itself in the cylinder, and an exhaust passage passing longitudinally through the tool body and the yoke connecting with the valve slideway at one end and terminating at the outer end of said yoke in a port to direct exhaust air from the piston cylinder against an implement secured to th piston rod.

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